

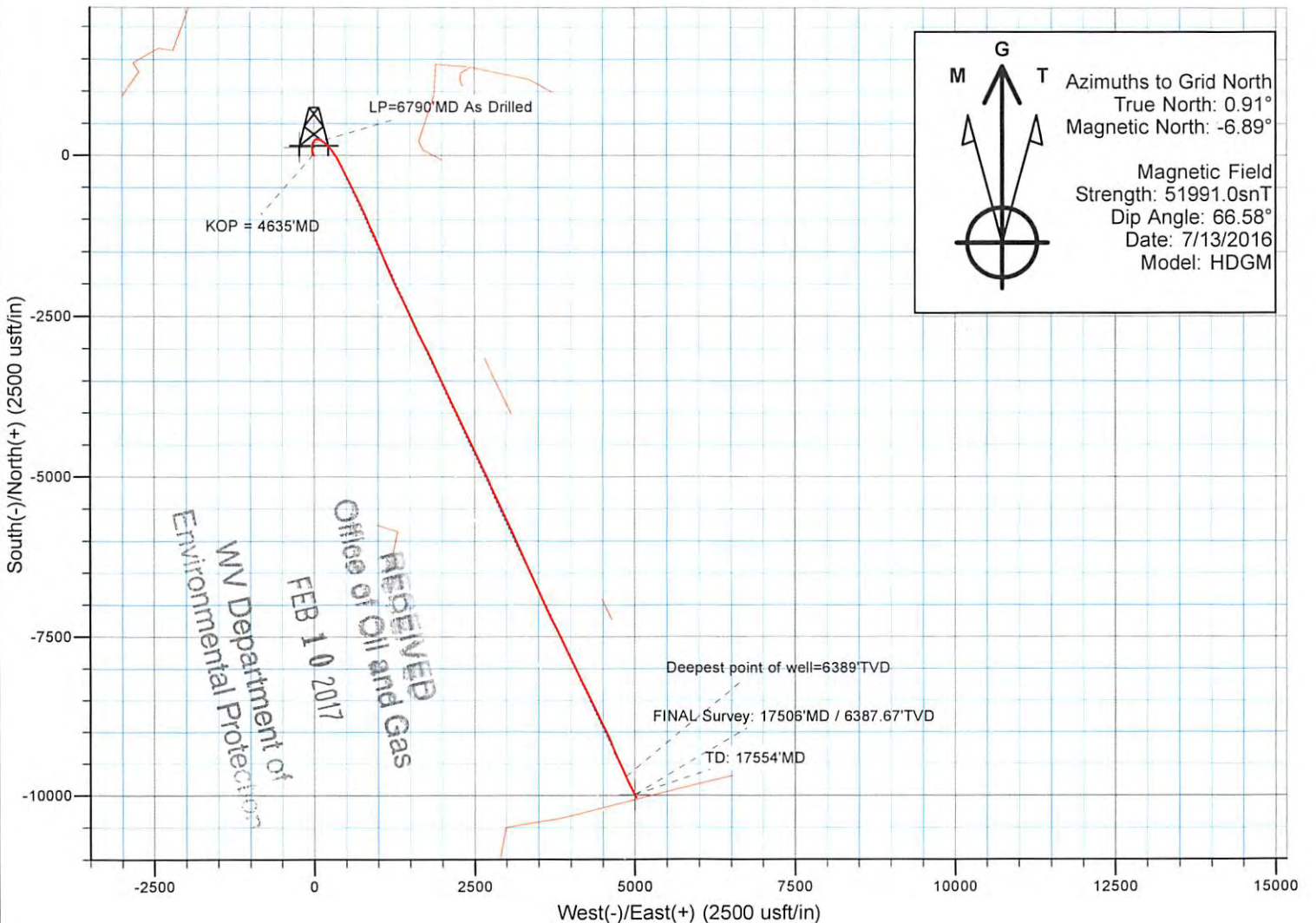
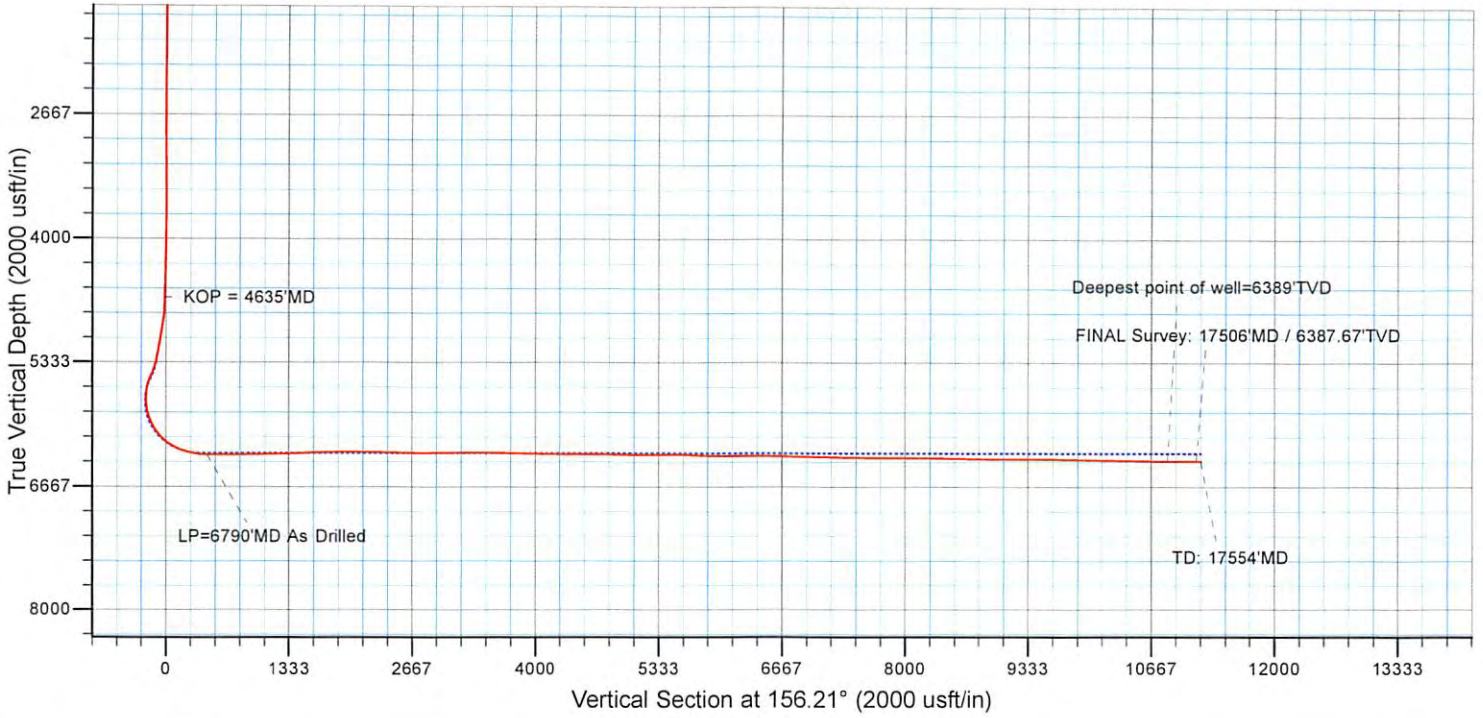


Where energy meets innovation.

Project: Ritchie County, WV
Site: PEN54
Well: Well #514476
Wellbore: Main Wellbore
Design: 514476 As Drilled Surveys



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 WV Department of
 Environmental Protection

05/19/2017

Survey Report

Company: EQT PRODUCTION	Local Co-ordinate Reference: Well Well #514476 - Slot 514476
Project: Ritchie County, WV	TVD Reference: KB@23 @ 1039.0usft
Site: PEN54	MD Reference: KB@23 @ 1039.0usft
Well: Well #514476	North Reference: Grid
Wellbore: Main Wellbore	Survey Calculation Method: Minimum Curvature
Design: 514476 As Drilled Surveys	Database: Well_Planner1

Project	Ritchie County, WV		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	West Virginia North 4701		

Site	PEN54		
Site Position:	Northing:	279,215.27 usft	Latitude: 39° 15' 28.054 N
From: Map	Easting:	1,595,775.03 usft	Longitude: 80° 55' 39.233 W
Position Uncertainty:	0.0 usft	Slot Radius: 13-3/16 "	Grid Convergence: -0.91 °

Well	Well #514476 - Slot 514476			
Well Position	+N-S	0.0 usft	Northing: 279,188.08 usft	Latitude: 39° 15' 27.788 N
	+E-W	0.0 usft	Easting: 1,595,787.72 usft	Longitude: 80° 55' 39.066 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level: 1,016.0 usft

Wellbore	Main Wellbore				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/13/2016	-7.80	66.58	51,991

Design	514476 As Drilled Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.0	0.0	0.0	156.21	

Survey Program	Date 8/11/2016				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	4,612.0	514476 Gyrodata Gyros (Main Wellbore)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
4,630.0	5,163.0	514476 Pro D MWD 2 (Main Wellbore)	MWD - OWSG	MWD - OWSG	
5,249.0	17,554.0	514476 Pro D MWD 3 (Main Wellbore)	MWD - OWSG	MWD - OWSG	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
10.0	0.30	81.73	100.0	0.0	0.3	0.1	0.30	0.30	0.00
20.0	0.24	110.98	200.0	0.0	0.7	0.3	0.15	-0.06	29.25
300.0	0.20	105.09	300.0	-0.1	1.1	0.5	0.05	-0.04	-5.89
400.0	0.22	111.55	400.0	-0.2	1.4	0.8	0.03	0.02	6.46
500.0	0.19	109.61	500.0	-0.4	1.8	1.0	0.03	-0.03	-1.94
600.0	0.19	104.36	600.0	-0.5	2.1	1.3	0.02	0.00	-5.25
700.0	0.20	110.67	700.0	-0.6	2.4	1.5	0.02	0.01	6.31
800.0	0.04	187.23	800.0	-0.7	2.6	1.6	0.19	-0.16	76.56

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900.0	0.07	179.53	900.0	-0.8	2.6	1.7	0.03	0.03	-7.70
1,000.0	0.05	158.41	1,000.0	-0.9	2.6	1.8	0.03	-0.02	-21.12
1,100.0	0.07	331.31	1,100.0	-0.8	2.6	1.8	0.12	0.02	172.90
1,200.0	0.08	341.31	1,200.0	-0.7	2.5	1.7	0.02	0.01	10.00
1,300.0	0.05	321.14	1,300.0	-0.6	2.5	1.6	0.04	-0.03	-20.17
1,400.0	0.07	325.21	1,400.0	-0.5	2.4	1.5	0.02	0.02	4.07
1,500.0	0.05	318.11	1,500.0	-0.5	2.3	1.4	0.02	-0.02	-7.10
1,600.0	0.37	266.12	1,600.0	-0.4	2.0	1.2	0.34	0.32	-51.99
1,700.0	0.39	268.41	1,700.0	-0.5	1.3	1.0	0.03	0.02	2.29
1,800.0	0.41	263.76	1,800.0	-0.5	0.6	0.7	0.04	0.02	-4.65
1,900.0	0.37	265.88	1,900.0	-0.6	-0.1	0.5	0.04	-0.04	2.12
2,000.0	0.35	273.09	2,000.0	-0.6	-0.7	0.3	0.05	-0.02	7.21
2,100.0	0.27	315.86	2,100.0	-0.4	-1.2	-0.1	0.24	-0.08	42.77
2,200.0	0.17	338.19	2,200.0	-0.1	-1.4	-0.5	0.13	-0.10	22.33
2,300.0	0.21	332.21	2,300.0	0.2	-1.5	-0.8	0.04	0.04	-5.98
2,400.0	0.16	328.30	2,400.0	0.5	-1.7	-1.1	0.05	-0.05	-3.91
2,500.0	0.09	12.22	2,500.0	0.7	-1.7	-1.3	0.11	-0.07	43.92
2,600.0	0.11	39.64	2,600.0	0.8	-1.6	-1.4	0.05	0.02	27.42
2,700.0	0.11	340.65	2,700.0	1.0	-1.6	-1.6	0.11	0.00	-58.99
2,800.0	0.10	36.51	2,800.0	1.2	-1.6	-1.7	0.10	-0.01	55.86
2,900.0	0.08	44.86	2,900.0	1.3	-1.5	-1.8	0.02	-0.02	8.35
3,000.0	0.08	136.75	3,000.0	1.3	-1.4	-1.7	0.11	0.00	91.89
3,100.0	0.09	163.80	3,100.0	1.1	-1.3	-1.6	0.04	0.01	27.05
3,200.0	0.08	115.59	3,200.0	1.0	-1.2	-1.5	0.07	-0.01	-48.21
3,300.0	0.06	186.40	3,300.0	1.0	-1.2	-1.4	0.08	-0.02	70.81
3,400.0	0.07	152.14	3,400.0	0.8	-1.2	-1.2	0.04	0.01	-34.26
3,500.0	0.05	147.88	3,500.0	0.8	-1.1	-1.1	0.02	-0.02	-4.26
3,600.0	0.07	162.21	3,600.0	0.7	-1.1	-1.0	0.02	0.02	14.33
3,700.0	0.06	206.81	3,700.0	0.6	-1.1	-0.9	0.05	-0.01	44.60
3,800.0	0.08	192.04	3,800.0	0.4	-1.1	-0.9	0.03	0.02	-14.77
3,900.0	0.15	298.61	3,900.0	0.4	-1.2	-0.9	0.19	0.07	106.57
4,000.0	0.26	320.09	4,000.0	0.7	-1.5	-1.2	0.13	0.11	21.48
4,100.0	0.42	329.28	4,100.0	1.2	-1.8	-1.8	0.17	0.16	9.19
4,200.0	0.73	332.50	4,200.0	2.0	-2.3	-2.8	0.31	0.31	3.22
4,300.0	0.97	330.22	4,300.0	3.3	-3.0	-4.3	0.24	0.24	-2.28
4,400.0	1.23	333.29	4,399.9	5.0	-3.9	-6.2	0.27	0.26	3.07
4,500.0	1.57	333.10	4,499.9	7.2	-5.0	-8.6	0.34	0.34	-0.19
4,600.0	2.10	336.18	4,599.9	10.1	-6.4	-11.8	0.54	0.53	3.08
4,612.0	2.14	336.39	4,611.9	10.5	-6.6	-12.3	0.34	0.33	1.75
4,630.0	1.98	334.86	4,629.8	11.1	-6.8	-12.9	0.94	-0.89	-8.50
4,635.0	2.02	334.25	4,634.8	11.3	-6.9	-13.1	0.85	0.73	-12.29
KOP = 4635'MD									
4,661.0	2.21	331.38	4,660.8	12.1	-7.4	-14.1	0.85	0.74	-11.02

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4,693.0	2.78	324.61	4,692.8	13.3	-8.1	-15.4	2.00	1.78	-21.16
4,724.0	3.73	315.76	4,723.7	14.6	-9.2	-17.1	3.46	3.06	-28.55
4,756.0	5.02	308.98	4,755.6	16.3	-11.1	-19.3	4.34	4.03	-21.19
4,787.0	5.90	309.11	4,786.5	18.1	-13.3	-22.0	2.84	2.84	0.42
4,819.0	6.20	317.20	4,818.3	20.4	-15.8	-25.1	2.82	0.94	25.28
4,850.0	6.70	326.53	4,849.1	23.2	-17.9	-28.4	3.74	1.61	30.10
4,882.0	7.50	331.50	4,880.9	26.5	-20.0	-32.3	3.15	2.50	15.53
4,913.0	8.24	334.70	4,911.6	30.3	-21.9	-36.6	2.77	2.39	10.32
4,945.0	9.04	339.18	4,943.2	34.8	-23.7	-41.4	3.27	2.50	14.00
4,976.0	9.71	343.50	4,973.8	39.5	-25.4	-46.4	3.13	2.16	13.94
5,007.0	10.07	347.28	5,004.4	44.7	-26.7	-51.7	2.39	1.16	12.19
5,039.0	10.51	349.04	5,035.8	50.3	-27.9	-57.3	1.69	1.38	5.50
5,070.0	10.83	351.72	5,066.3	55.9	-28.8	-62.8	1.90	1.03	8.65
5,102.0	10.54	354.95	5,097.8	61.8	-29.5	-68.5	2.08	-0.91	10.09
5,133.0	10.28	357.25	5,128.2	67.4	-29.9	-73.8	1.58	-0.84	7.42
5,163.0	10.59	358.61	5,157.7	72.9	-30.1	-78.8	1.32	1.03	4.53
5,249.0	11.10	357.10	5,242.2	89.0	-30.7	-93.8	0.68	0.59	-1.76
5,281.0	10.90	356.70	5,273.6	95.1	-31.0	-99.6	0.67	-0.63	-1.25
5,312.0	12.80	354.90	5,304.0	101.5	-31.5	-105.6	6.24	6.13	-5.81
5,344.0	15.40	357.90	5,335.0	109.2	-32.0	-112.9	8.44	8.13	9.38
5,375.0	17.50	2.90	5,364.7	118.0	-31.9	-120.8	8.16	6.77	16.13
5,407.0	20.80	5.50	5,395.0	128.5	-31.1	-130.1	10.65	10.31	8.13
5,438.0	23.90	5.00	5,423.6	140.2	-30.0	-140.4	10.02	10.00	-1.61
5,469.0	26.40	6.10	5,451.7	153.3	-28.7	-151.9	8.20	8.06	3.55
5,501.0	30.20	8.90	5,479.8	168.4	-26.7	-164.8	12.55	11.88	8.75
5,532.0	28.90	13.20	5,506.8	183.4	-23.8	-177.4	8.02	7.19	10.09
5,564.0	25.50	18.10	5,535.3	197.4	-19.9	-188.7	12.72	-10.63	15.31
5,595.0	22.00	25.10	5,563.7	209.0	-15.4	-197.5	14.48	12.99	22.58
5,627.0	19.40	34.20	5,593.6	218.9	-9.9	-204.2	12.90	-8.13	28.44
5,658.0	18.70	44.80	5,622.9	226.7	-3.5	-208.8	11.37	8.95	34.19
5,690.0	18.70	48.20	5,653.2	233.7	4.0	-212.3	11.41	0.00	10.63
5,721.0	18.00	53.10	5,682.6	239.9	11.5	-214.9	5.46	2.26	2.26
5,752.0	17.60	59.50	5,712.2	245.2	19.4	-216.5	6.44	-1.29	20.65
5,784.0	17.00	67.30	5,742.7	249.4	27.9	-217.0	7.48	-1.88	24.38
5,815.0	17.40	79.80	5,772.3	252.0	36.6	-215.8	11.97	1.29	40.32
5,847.0	18.30	87.20	5,802.8	253.1	46.3	-212.9	7.62	2.81	23.13
5,878.0	20.70	97.00	5,832.0	252.7	56.7	-208.3	13.06	7.74	31.61
5,910.0	22.80	102.90	5,861.8	250.6	68.3	-201.7	9.47	6.56	18.44
5,941.0	24.80	108.30	5,890.1	247.2	80.3	-193.8	9.54	6.45	17.42
5,973.0	26.20	114.10	5,919.0	242.2	93.2	-184.0	8.94	4.38	18.13
6,004.0	28.40	117.60	5,946.6	236.0	105.9	-173.2	8.78	7.10	11.29
6,035.0	29.60	118.50	5,973.7	228.9	119.2	-161.4	4.12	3.87	2.90
6,067.0	30.90	120.80	6,001.3	220.9	133.2	-148.4	5.44	4.06	7.19
6,098.0	33.40	124.30	6,027.6	212.1	147.1	-134.7	10.05	8.06	11.29

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6,130.0	35.50	127.80	6,053.9	201.4	161.7	-119.1	9.02	6.56	10.94
6,161.0	38.60	130.20	6,078.7	189.6	176.2	-102.4	11.03	10.00	7.74
6,193.0	42.70	131.90	6,103.0	175.9	191.9	-83.6	13.27	12.81	5.31
6,224.0	45.80	134.40	6,125.2	161.1	207.7	-63.7	11.47	10.00	8.06
6,256.0	48.50	136.20	6,146.9	144.5	224.2	-41.8	9.39	8.44	5.63
6,287.0	51.10	138.70	6,166.9	127.0	240.2	-19.3	10.40	8.39	8.06
6,319.0	53.10	141.50	6,186.6	107.6	256.4	4.9	9.31	6.25	8.75
6,350.0	55.60	142.20	6,204.7	87.8	271.9	29.3	8.27	8.06	2.26
6,381.0	59.00	143.10	6,221.4	67.1	287.8	54.7	11.24	10.97	2.90
6,413.0	62.50	144.60	6,237.0	44.6	304.2	81.9	11.68	10.94	4.69
6,444.0	65.80	146.20	6,250.6	21.6	320.1	109.3	11.61	10.65	5.16
6,476.0	69.40	148.30	6,262.8	-3.3	336.1	138.6	12.78	11.25	6.56
6,507.0	72.30	149.70	6,272.9	-28.4	351.1	167.6	10.28	9.35	4.52
6,539.0	73.00	150.10	6,282.5	-54.8	366.4	198.0	2.49	2.19	1.25
6,570.0	74.80	150.50	6,291.1	-80.7	381.2	227.6	5.94	5.81	1.29
6,601.0	75.90	151.70	6,298.9	-106.9	395.7	257.5	5.16	3.55	3.87
6,633.0	77.40	153.30	6,306.3	-134.6	410.1	288.5	6.76	4.69	5.00
6,664.0	80.00	154.50	6,312.4	-161.9	423.4	318.9	9.21	8.39	3.87
6,695.0	83.00	154.80	6,316.9	-189.6	436.6	349.6	9.72	9.68	0.97
6,790.0	89.10	153.90	6,323.5	-274.9	477.6	444.2	6.49	6.42	-0.95
LP=6790'MD As Drilled									
6,884.0	88.70	152.70	6,325.3	-358.9	519.8	538.1	1.35	-0.43	-1.28
6,979.0	91.50	154.50	6,325.1	-444.0	562.0	633.0	3.50	2.95	1.89
7,073.0	93.10	154.00	6,321.4	-528.6	602.8	726.8	1.78	1.70	-0.53
7,167.0	89.40	153.90	6,319.3	-613.0	644.1	820.7	3.94	-3.94	-0.11
7,214.0	89.40	153.50	6,319.8	-655.1	664.9	867.7	0.85	0.00	-0.85
7,262.0	89.60	153.50	6,320.2	-698.1	686.3	915.6	0.42	0.42	0.00
7,293.0	90.30	154.30	6,320.2	-725.9	700.0	946.6	3.43	2.26	2.58
7,356.0	91.40	154.90	6,319.3	-782.8	727.0	1,009.6	1.99	1.75	0.95
7,451.0	91.30	154.50	6,317.1	-868.7	767.6	1,104.5	0.43	-0.11	-0.42
7,545.0	91.90	157.30	6,314.4	-954.5	806.0	1,198.5	3.05	0.64	2.98
7,640.0	91.80	155.20	6,311.4	-1,041.4	844.2	1,293.4	2.21	-0.11	-2.21
7,734.0	92.20	153.50	6,308.1	-1,126.0	884.9	1,387.3	1.86	0.43	-1.81
7,829.0	92.70	155.50	6,304.0	-1,211.7	925.7	1,482.2	2.17	0.53	2.11
7,923.0	92.80	154.60	6,299.5	-1,296.8	965.3	1,576.0	0.96	0.11	-0.96
8,018.0	93.50	157.60	6,294.3	-1,383.5	1,003.7	1,670.9	3.24	0.74	3.16
8,112.0	91.50	159.30	6,290.2	-1,470.9	1,038.2	1,764.7	2.79	-2.13	1.81
8,206.0	89.60	158.10	6,289.3	-1,558.5	1,072.4	1,858.6	2.39	-2.02	-1.28
8,300.0	89.10	156.30	6,290.4	-1,645.1	1,108.8	1,952.6	1.99	-0.53	-1.91
8,395.0	87.90	155.70	6,292.9	-1,731.9	1,147.4	2,047.6	1.41	-1.26	-0.63
8,489.0	88.90	157.00	6,295.5	-1,817.9	1,185.1	2,141.5	1.74	1.06	1.38
8,583.0	91.10	156.90	6,295.5	-1,904.4	1,221.9	2,235.5	2.34	2.34	-0.11
8,678.0	89.20	155.40	6,295.2	-1,991.3	1,260.3	2,330.5	2.55	-2.00	-1.58

Survey Report

Company: EQT PRODUCTION
Project: Ritchie County, WV
Site: PEN54
Well: Well #514476
Wellbore: Main Wellbore
Design: 514476 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514476 - Slot 514476
TVD Reference: KB@23 @ 1039.0usft
MD Reference: KB@23 @ 1039.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,772.0	88.60	153.10	6,297.0	-2,075.9	1,301.2	2,424.4	2.53	-0.64	-2.45
8,866.0	88.50	152.50	6,299.4	-2,159.5	1,344.1	2,518.2	0.65	-0.11	-0.64
8,961.0	88.80	152.10	6,301.6	-2,243.6	1,388.3	2,613.0	0.53	0.32	-0.42
9,055.0	89.00	155.10	6,303.5	-2,327.8	1,430.0	2,706.8	3.20	0.21	3.19
9,150.0	90.20	157.00	6,304.1	-2,414.6	1,468.6	2,801.8	2.37	1.26	2.00
9,244.0	91.70	156.90	6,302.6	-2,501.1	1,505.4	2,895.8	1.60	1.60	-0.11
9,338.0	89.80	155.40	6,301.3	-2,587.0	1,543.4	2,989.8	2.58	-2.02	-1.60
9,363.0	89.70	156.10	6,301.4	-2,609.8	1,553.7	3,014.8	2.83	-0.40	2.80
9,457.0	91.30	152.90	6,300.6	-2,694.6	1,594.1	3,108.7	3.81	1.70	-3.40
9,551.0	91.40	152.10	6,298.4	-2,778.0	1,637.5	3,202.5	0.86	0.11	-0.85
9,645.0	90.80	153.50	6,296.6	-2,861.6	1,680.5	3,296.3	1.62	-0.64	1.49
9,739.0	88.70	152.90	6,297.0	-2,945.5	1,722.9	3,390.2	2.32	-2.23	-0.64
9,833.0	88.40	152.10	6,299.4	-3,028.8	1,766.3	3,484.0	0.91	-0.32	-0.85
9,928.0	88.80	155.00	6,301.7	-3,113.9	1,808.5	3,578.8	3.08	0.42	3.05
10,022.0	89.30	155.10	6,303.3	-3,199.1	1,848.2	3,672.8	0.54	0.53	0.11
10,116.0	89.70	155.50	6,304.1	-3,284.5	1,887.5	3,766.8	0.60	0.43	0.43
10,210.0	87.80	155.40	6,306.1	-3,370.0	1,926.5	3,860.7	2.02	-2.02	-0.11
10,305.0	88.10	155.50	6,309.5	-3,456.3	1,966.0	3,955.7	0.33	0.32	0.11
10,399.0	88.40	155.50	6,312.4	-3,541.8	2,004.9	4,049.6	0.32	0.32	0.00
10,494.0	88.90	154.30	6,314.6	-3,627.8	2,045.2	4,144.6	1.37	0.53	-1.26
10,588.0	89.50	154.60	6,316.0	-3,712.6	2,085.8	4,238.5	0.71	0.64	0.32
10,682.0	90.00	154.60	6,316.4	-3,797.5	2,126.1	4,332.5	0.53	0.53	0.00
10,776.0	90.90	154.10	6,315.6	-3,882.3	2,166.8	4,426.4	1.10	0.96	-0.53
10,871.0	90.10	155.40	6,314.8	-3,968.2	2,207.3	4,521.4	1.61	-0.84	1.37
10,965.0	90.40	155.10	6,314.4	-4,053.5	2,246.6	4,615.4	0.45	0.32	-0.32
11,059.0	89.90	153.00	6,314.1	-4,138.1	2,287.8	4,709.3	2.30	-0.53	-2.23
11,153.0	87.60	155.30	6,316.2	-4,222.6	2,328.7	4,803.2	3.46	-2.45	2.45
11,248.0	87.60	155.50	6,320.2	-4,308.9	2,368.2	4,898.1	0.21	0.00	0.21
11,342.0	88.10	155.80	6,323.7	-4,394.5	2,407.0	4,992.0	0.62	0.53	0.32
11,436.0	90.00	155.60	6,325.3	-4,480.1	2,445.7	5,086.0	2.03	2.02	-0.21
11,531.0	90.50	154.60	6,324.8	-4,566.3	2,485.6	5,181.0	1.18	0.53	-1.05
11,625.0	91.40	154.50	6,323.3	-4,651.2	2,526.0	5,274.9	0.96	0.96	-0.11
11,719.0	91.00	153.90	6,321.3	-4,735.8	2,566.9	5,368.9	0.77	-0.43	-0.64
11,814.0	91.60	153.70	6,319.2	-4,821.0	2,608.9	5,463.7	0.67	0.63	-0.21
11,908.0	87.90	155.10	6,319.6	-4,905.8	2,649.5	5,557.7	4.21	-3.94	1.49
12,002.0	88.30	155.40	6,322.7	-4,991.1	2,688.8	5,651.6	0.53	0.43	0.32
12,096.0	87.50	155.60	6,326.1	-5,076.6	2,727.8	5,745.5	0.88	-0.85	0.21
12,191.0	87.70	155.40	6,330.1	-5,162.9	2,767.1	5,840.5	0.30	0.21	-0.21
12,285.0	88.50	155.40	6,333.2	-5,248.4	2,806.2	5,934.4	0.85	0.85	0.00
12,380.0	89.40	154.40	6,335.0	-5,334.4	2,846.5	6,029.3	1.42	0.95	-1.05
12,474.0	90.20	154.10	6,335.3	-5,419.0	2,887.4	6,123.3	0.91	0.85	-0.32
12,568.0	90.80	153.80	6,334.5	-5,503.5	2,928.6	6,217.2	0.71	0.64	-0.32
12,663.0	91.30	153.30	6,332.7	-5,588.5	2,971.0	6,312.1	0.74	0.53	-0.53

Survey Report

Company: EQT PRODUCTION
Project: Ritchie County, WV
Site: PEN54
Well: Well #514476
Wellbore: Main Wellbore
Design: 514476 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514476 - Slot 514476
TVD Reference: KB@23 @ 1039.0usft
MD Reference: KB@23 @ 1039.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,757.0	89.00	155.00	6,332.5	-5,673.1	3,011.9	6,406.0	3.04	-2.45	1.81
12,852.0	89.70	155.40	6,333.6	-5,759.3	3,051.8	6,501.0	0.85	0.74	0.42
12,946.0	88.40	156.20	6,335.1	-5,845.1	3,090.3	6,595.0	1.62	-1.38	0.85
13,040.0	88.70	156.40	6,337.5	-5,931.1	3,128.1	6,689.0	0.38	0.32	0.21
13,134.0	90.40	157.60	6,338.2	-6,017.6	3,164.8	6,782.9	2.21	1.81	1.28
13,229.0	88.10	156.00	6,339.5	-6,104.9	3,202.2	6,877.9	2.95	-2.42	-1.68
13,323.0	88.90	156.30	6,341.9	-6,190.9	3,240.2	6,971.9	0.91	0.85	0.32
13,418.0	88.90	156.20	6,343.8	-6,277.8	3,278.5	7,066.9	0.11	0.00	-0.11
13,512.0	88.80	155.30	6,345.7	-6,363.5	3,317.1	7,160.8	0.96	-0.11	-0.96
13,607.0	89.70	155.40	6,346.9	-6,449.8	3,356.7	7,255.8	0.95	0.95	0.11
13,701.0	88.10	155.90	6,348.7	-6,535.4	3,395.4	7,349.8	1.78	-1.70	0.53
13,795.0	88.30	155.80	6,351.7	-6,621.2	3,433.9	7,443.7	0.24	0.21	-0.11
13,889.0	89.10	156.90	6,353.8	-6,707.3	3,471.6	7,537.7	1.45	0.85	1.17
13,983.0	89.80	157.00	6,354.7	-6,793.8	3,508.4	7,631.7	0.75	0.74	0.11
14,078.0	90.40	156.10	6,354.5	-6,880.9	3,546.2	7,726.7	1.14	0.63	-0.95
14,172.0	90.20	155.10	6,354.0	-6,966.5	3,585.0	7,820.7	1.08	-0.21	-1.06
14,266.0	90.90	155.50	6,353.1	-7,051.9	3,624.3	7,914.7	0.86	0.74	0.43
14,360.0	88.80	153.30	6,353.4	-7,136.7	3,664.9	8,008.6	3.24	-2.23	-2.34
14,455.0	89.20	153.70	6,355.0	-7,221.7	3,707.3	8,103.5	0.60	0.42	0.42
14,549.0	89.70	153.60	6,355.9	-7,305.9	3,749.0	8,197.4	0.54	0.53	-0.11
14,643.0	88.80	153.30	6,357.2	-7,390.0	3,791.0	8,291.3	1.01	-0.96	-0.32
14,738.0	89.70	153.30	6,358.4	-7,474.8	3,833.7	8,386.2	0.95	0.95	0.00
14,832.0	89.10	154.70	6,359.4	-7,559.3	3,874.9	8,480.1	1.62	-0.64	1.49
14,927.0	89.80	155.10	6,360.3	-7,645.3	3,915.2	8,575.0	0.85	0.74	0.42
15,021.0	87.70	154.90	6,362.4	-7,730.5	3,954.9	8,669.0	2.24	-2.23	-0.21
15,115.0	88.20	154.70	6,365.7	-7,815.5	3,994.9	8,762.9	0.57	0.53	-0.21
15,209.0	89.10	155.50	6,367.9	-7,900.7	4,034.5	8,856.9	1.28	0.98	0.85
15,303.0	90.10	155.10	6,368.6	-7,986.1	4,073.7	8,950.8	1.15	1.06	-0.43
15,398.0	90.90	154.80	6,367.8	-8,072.2	4,114.0	9,045.8	0.90	0.84	-0.32
15,492.0	89.20	154.60	6,367.7	-8,157.2	4,154.1	9,139.8	1.82	-1.81	-0.21
15,586.0	89.90	154.60	6,368.4	-8,242.1	4,194.5	9,233.7	0.74	0.74	0.00
15,681.0	90.70	154.60	6,367.9	-8,327.9	4,235.2	9,328.7	0.84	0.84	0.00
15,775.0	91.00	153.50	6,366.5	-8,412.4	4,276.3	9,422.6	1.21	0.32	-1.17
15,869.0	88.50	155.80	6,366.9	-8,497.4	4,316.6	9,516.6	3.61	-2.66	2.45
15,964.0	89.00	155.10	6,369.0	-8,583.7	4,356.0	9,611.5	0.91	0.53	-0.74
16,058.0	88.90	154.90	6,370.7	-8,668.9	4,395.8	9,705.5	0.24	-0.11	-0.21
16,152.0	89.40	154.60	6,372.1	-8,753.9	4,435.8	9,799.5	0.62	0.53	-0.32
16,247.0	89.60	152.90	6,373.0	-8,839.1	4,477.9	9,894.4	1.80	0.21	-1.79
16,341.0	88.60	154.00	6,374.4	-8,923.2	4,519.9	9,988.2	1.58	-1.06	1.17
16,436.0	88.90	155.90	6,376.5	-9,009.2	4,560.1	10,083.2	2.02	0.32	2.00
16,530.0	88.30	156.10	6,378.8	-9,095.1	4,598.3	10,177.2	0.67	-0.64	0.21
16,627.0	89.10	155.90	6,381.0	-9,183.7	4,637.7	10,274.1	0.85	0.82	-0.21
16,722.0	90.20	155.80	6,381.6	-9,270.4	4,676.6	10,369.1	1.16	1.16	-0.11
16,817.0	88.80	156.30	6,382.4	-9,357.2	4,715.2	10,464.1	1.56	-1.47	0.53

Survey Report

Company: EQT PRODUCTION
Project: Ritchie County, WV
Site: PEN54
Well: Well #514476
Wellbore: Main Wellbore
Design: 514476 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514476 - Slot 514476
TVD Reference: KB@23 @ 1039.0usft
MD Reference: KB@23 @ 1039.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Doglog Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
16,912.0	89.70	156.10	6,383.7	-9,444.1	4,753.5	10,559.1	0.97	0.95	-0.21
17,006.0	87.80	156.90	6,385.7	-9,530.3	4,791.0	10,653.1	2.19	-2.02	0.85
17,101.0	88.80	157.30	6,388.5	-9,617.7	4,827.9	10,748.0	1.13	1.05	0.42
17,195.0	90.10	154.90	6,389.4	-9,703.7	4,866.0	10,842.0	2.90	1.38	-2.55
Deepest point of well=6389'TVD									
17,290.0	90.80	154.60	6,388.7	-9,789.6	4,906.5	10,937.0	0.80	0.74	-0.32
17,384.0	89.80	153.40	6,388.2	-9,874.1	4,947.7	11,030.9	1.66	-1.06	-1.28
17,479.0	90.40	152.40	6,388.0	-9,958.6	4,991.0	11,125.8	1.23	0.63	-1.05
17,506.0	91.10	152.50	6,387.7	-9,982.6	5,003.5	11,152.7	2.62	2.59	0.37
FINAL Survey: 17506'MD / 6387.67'TVD									
17,554.0	91.10	152.50	6,386.7	-10,025.1	5,025.7	11,200.6	0.00	0.00	0.00
TD: 17554'MD									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N-S (usft)	+E-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
LP=6790'MD As Drilled	0.00	360.00	0.0	123.7	-224.6	279,311.73	1,595,563.08	39° 15' 28.975 N	80° 55' 41.947 W
- hit/miss target									
- Shape									
- actual wellpath misses target center by 256.4usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)									
- Point									
TD: 17554'MD	0.00	360.00	0.0	-9,982.6	5,003.5	269,205.50	1,600,791.21	39° 13' 49.911 N	80° 54' 33.472 W
- actual wellpath misses target center by 6386.9usft at 17554.0usft MD (6386.7 TVD, -10025.1 N, 5025.7 E)									
- Point									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Comment
4,635.0	4,634.8	11.3	-6.9	KOP = 4635'MD
6,790.0	6,323.5	-274.9	477.6	LP=6790'MD As Drilled
17,195.0	6,389.4	-9,703.7	4,866.0	Deepest point of well=6389'TVD
17,506.0	6,387.7	-9,982.6	5,003.5	FINAL Survey: 17506'MD / 6387.67'TVD
17,554.0	6,386.7	-10,025.1	5,025.7	TD: 17554'MD

Checked By: _____ Approved By: _____ Date: _____